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FOREIGN AGRICULTURE REPORT
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WASHINGTON, D.C.

DAIRY PRODUCTS SITUATION AND OUTLOOK IN CHILE

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by

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FOREWORD

In few countries of the Western Hemisphere has there been inaugurated a more well-rounded program of milk production, utilization, and distribution than in Chile. Under this program, which was set up by a number of Government agencies and is supported by milk producers, processors, distributors, and cooperatives, improvements are being made in quality, in milk solids utilization, in more even seasonal production, and in the geographic and equitable distribution of milk and dairy products. Also participating in this and other programs aimed at improving the economic well-being of Chile's people are such international organizations as the Food and Agriculture Organization of the United Nations, the United Nations International Children's Emergency Fund, the Institute of Inter-American Affairs, and the International Bank. An upward trend in the per capita production of milk and milk products over the last 10 to 12 years has been accomplished without any perceptible increase in cow numbers.

Concurrent with this increase in milk production has been the gradual development of Chile's mining, iron and steel, hydroelectric power and manufacturing industries. There has been a noticeable expansion in the population of urban areas, especially as compared with some rural sections. Chile has continued to import moderate quantities of dry whole, evaporated, and condensed milk and odd lots of butter and cheese.

This study was made to evaluate the possibility of a further increase in milk production, and what it may mean in terms of the adequacy of domestic supplies in the near future. It considers what dairy items may find their way into export markets, should Chile's milk production continue to expand.

It also treats the possibility of a short-term increase in United States exports of dairy products in the light of their present use, the foreign exchange situation, and the general level of Chile's purchasing power. It considers the long-term outlook for dairy product imports, should Chile's mining, electric power, and industrial potential continue to expand.

This study of the dairy products situation in Chile was conducted by George H. Day, Agricultural Economist, in 1951 as part of a broader survey covering the markets for dairy products in Latin America. Similar studies have been or are being prepared on Brazil, Argentina, Bolivia, Peru, and Ecuador. Because of the lack of previous published information on the dairy industry of Chile, and because of that country's comparative self-sufficiency in dairy products, it was considered advisable to issue this study in the form of a separate report. Similar studies covering Cuba, the Netherlands West Indies, Venezuela, and El Salvador were published in 1950.

This study was conducted under the provisions of the Research and Marketing Act of 1946. The possibilities of broadening and maintaining foreign markets for other agricultural commodities are also being studied, and the findings are presented in circulars and reports published by the Office of Foreign Agricultural Relations, United States Department of Agriculture, Washington 25, D. C.

Joseph A Becker

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While considerable help in the preparation of this report was given by the above individuals and others, the responsibility for all statements and conclusions are borne by the writer.

Summary and Conclusions

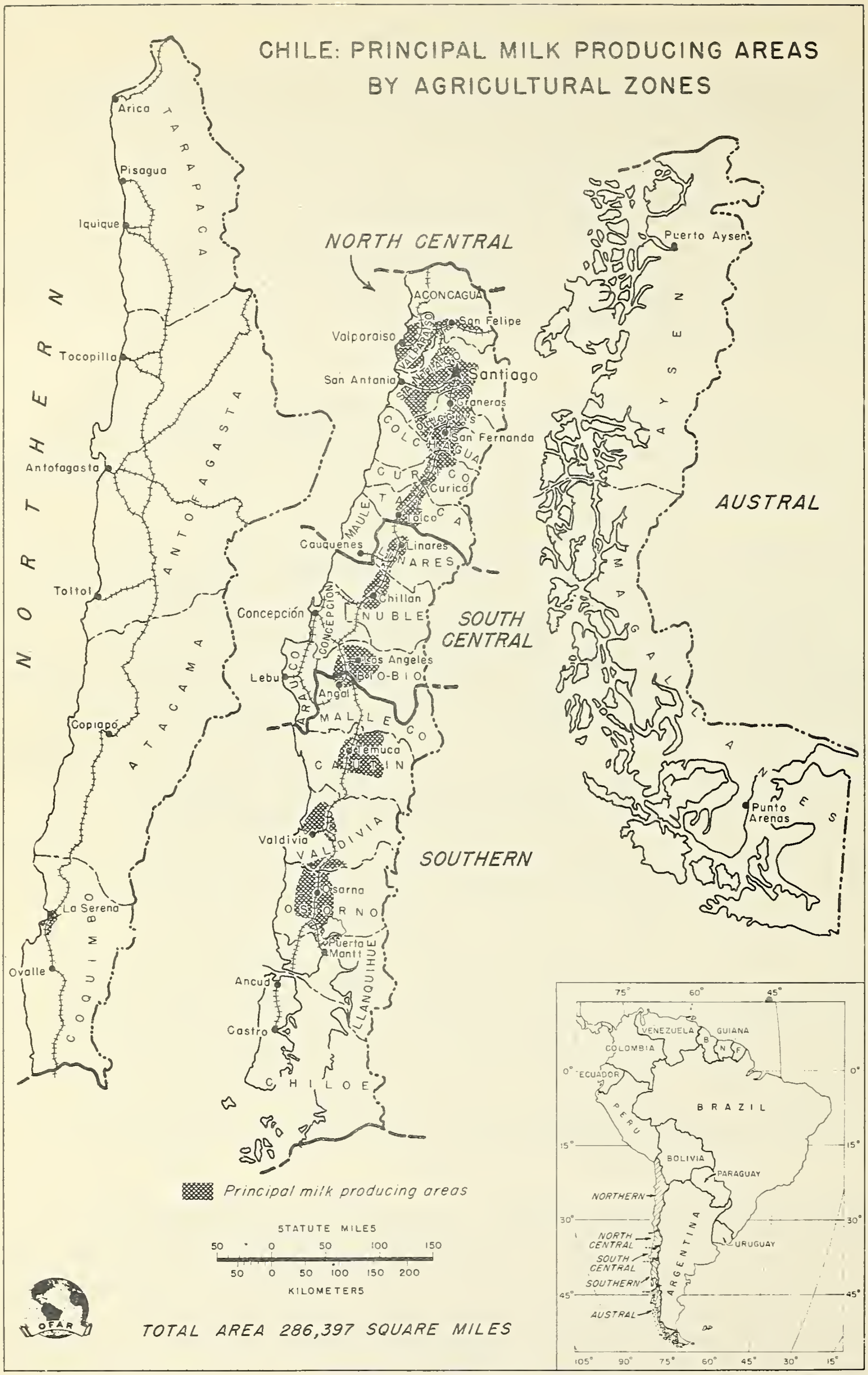
Under present economic conditions, Chile is nearly self-sufficient in the production of dairy products. Increased milk production is being accomplished by the use of improved stock, better feeding and herd management, and other dairy practices. The over-all rate of increase is relatively slow, however, especially in terms of per capita supplies, and all the milk appears to be needed for domestic use. It has been found necessary to give more emphasis to dairying to support the increased use of soil rebuilding crops and to provide supplementary income and additional food. Expanding industrial cities are increasing the national demand for dairy products, but at the same time they are tending to reduce the area available to cultivation.

It seems likely that exports of dairy products will be limited largely to certain cheeses. Such factors as competitive world prices, relatively high domestic costs, policies of safeguarding domestic supply, ceiling prices, and technical problems all appear to limit the possibility of exporting most other dairy products.

There seems to be little possibility of an appreciable increase in the near future in the limited volume of dried whole and evaporated milk imported from the United States. These imports have gone almost exclusively to mining companies in northern Chile under a special import arrangement, and they are sold by the companies under an agreement which sets resale prices to employees at such a low level as to discourage the importation of more than is necessary to meet the requirements of the relatively small number of employees. The price of milk from competing European suppliers acts as a threat to this small market. The Netherlands replaced the United States as a principal supplier of condensed milk in 1950. In addition, a new agreement between the Chilean Government and the copper companies is now being considered which may, through an adjustment in exchange rates, induce these companies to purchase local dairy products. The importation of Argentine butter, which was authorized under a barter arrangement in 1950, is not contemplated for the near future.

The necessity of continuing stringent foreign exchange controls to provide for imports of equipment essential to the development of Chilean industry and resources has made it necessary to impose restrictions on the importation of foodstuffs in which Chile is relatively self-sufficient. In addition, the prospect of imports is limited by the generally low level of purchasing power of the bulk of Chile's population. Until there is a general increase in purchasing power, at least three-quarters of Chile's population of less than 6 million people will continue to be dependent primarily on nationally grown foodstuffs.

The long-term outlook, however, appears much more favorable. The recently increased processing facilities and higher prices for copper, the improved demand for nitrates, the long-term prospects for exports of iron, steel, and petroleum products, and the steady development of manufacturing industries under the impetus of an increasing exploitation of the country's waterpower resources all point to a gradual increase in Chile's ability to purchase both domestic and imported merchandise.



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Production, Distribution, and Utilization of Milk

Areas of Production

About 95 percent of Chile's milk production, and probably about the same percentage of land suitable for dairying, is located in the central third of Chile's 2,600-mile length.[1] In this area, which extends south from the Province of Aconcagua, just north of Valparaiso, to Chiloe Province, is found 97 percent of all arable land. Much of it is in a fertile valley known as the Vale of Chile, which extends south from above Santiago for about 550 miles to Puerto Montt. This valley, hemmed in by the Andes and the coastal range, is from 30 to 150 miles wide; it has adequate irrigation water and a temperate climate.

The area to the north, known as the Northern Zone, is nearly all an alkaline desert with an annual average rainfall of less than 4 inches and high daily temperatures. Although it is sparsely populated, it contains the only commercially significant natural nitrate deposits and the world's largest known reserve of copper ore and other minerals.

The coastal area of the Austral Zone, which lies south of Chiloe, and much of the Province of Chiloe are almost unpopulated, densely wooded, and subject to heavy precipitation, storms, and fog. The strip of Chilean territory lying east of the Andes in the south, however, is drier and is used almost entirely for the grazing of sheep.

The Central Area can be conveniently, though rather arbitrarily, divided into three parts: (1) the North Central Zone which extends from the Province of Aconcagua south through the Provinces of Talca and Maule, (2) the South Central Zone, which extends from the Province of Linares south through Bio-Bio and Arauco, and (3) the Southern Zone which runs from the Province of Malleco to Chiloe on the south.

In the North Central Zone the greater part of the milk production comes from a relatively small number of large haciendas or "fundos" with herds ranging from 100 to 300 cows each. On these large farms, often several thousand acres in area, milk production is usually carried on as part of the general farming operation, which includes the raising of sheep and hogs, in addition to dairy cattle, and the growing of crops such as wheat, barley, beans, and grapes. Most of the work is done by farm laborers (inquilinos) who reside with their families in small homes on the premises. Most of the feed for dairy cattle is obtained from irrigated pastures which are grazed throughout the year since winters are moderate. Increasing amounts of hay, silage, and concentrates are being fed, however, and there are some fine dairy herds with production records which indicate the best of care.

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[1] If the Province of Coquimbo, just north of Aconcagua, is included in the central area, as is sometimes done, the combined area would account for about 99 percent of the milk produced. In the Province of Coquimbo milk is produced in a few irrigated valleys around some of the larger towns (Coquimbo, La Serena, Ovalle, and Illapel), and surplus milk is made into butter and cheese. Goats' milk cheese is of some importance in this Province. An increase in milk production may result from a drainage project at La Serena.

Most of the milk produced on the fundos is sold for fluid use to distributors in Santiago, Valparaiso, and other urban centers; some is sold for processing; and on some fundos milk is used only for the production of cheese and whey butter. Milk from a large number of suburban feed lot dairies of various sizes is peddled directly to the consumers in the form of raw milk and dairy products, and milk produced by family cows owned by residents of suburbs and small towns or by small farmers and occasionally by tenants is generally used for home consumption as fluid milk or cheese.

Modified dried milks are produced on a year-round basis at the Graneros plant of the principal milk processing company of Chile.2/ Occasional seasonal surpluses of this plant are used in the manufacture of condensed milk and butter, and some of the winter-season receipts are diverted to Santiago for fluid use. Considerable progress has been made by this company in reducing the seasonal variation in milk production and in improving both the quality and quantity of production through educational work backed by quality and seasonal differentials in prices paid. Similar work is being done by the Ministry of Agriculture, the leading dairymen, the local cooperatives, and the large Government-owned fluid milk distribution system.

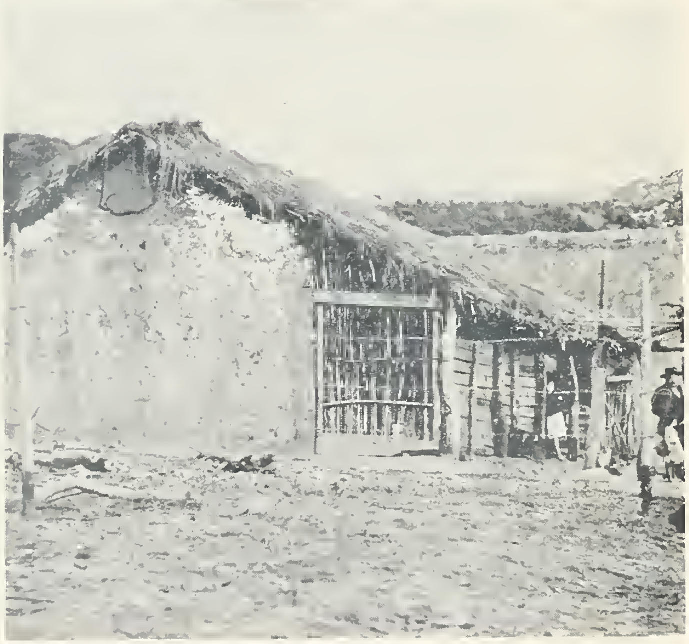
During the summer months (October-March) most of the milk for fluid use in Santiago and Valparaiso is produced within a radius of about 50 kilometers (30 to 35 miles) of these cities. The seasonal variation in production for fluid use is great, however, and during winter (April-September) shortages the principal fluid milk distributor for Santiago finds it necessary to pick up milk as far south as Talca, which lies in the Central Valley at the southern end of the zone, about 240 kilometers (nearly 150 miles) distant.

During the summer, large quantities of cheese and butter are made on haciendas and in factories in the less accessible valleys of this zone. One or two modern ice cream processors absorb most of the production of a few large herds and have developed a summertime sale of ice cream containing about 8 percent butterfat. With the exception of the modified dried milks which are distributed throughout the country and a small amount of products for home use, most of the dairy products of this zone are sold in the Santiago and Valparaiso marketing areas.

In the southern part of this zone at San Fernando, the Ministry of Health in cooperation with the United Nations International Children's Emergency Fund (UNICEF) is establishing a plant with a daily capacity of 50,000 fluid liters (about 114,000 pounds) for drying part of the seasonal surplus of skim milk for free distribution to needy mothers and children.3/

2/ The company has two other plants - one at Los Angeles in the South Central Zone and the other at Osorno in the Southern Zone. These are discussed later.
3/ A liter of milk weighs about 2.27 pounds and is equal to 1.0567 quarts.

Left. Irrigated pastures, supplied by water from Andean rivers through canals similar to the one shown, are the main source of feed for dairy cattle in most of the important milk producing areas of Central Chile, except the Osorno and Valdivia sections in the south where rainfall is generally ample.



Right. Home of a tenant worker (inquilino) and his family. Inquilinos furnish most of the dairy labor in the North Central and South Central zones. They are dependent largely on the landlord and on a small garden plot for their food requirements.

Fine Holsteins, such as the cow and calf shown above are being introduced from the United States and Canada into many dairy herds throughout Chile. About 20,000 head of purebred cattle have been registered, by about 200 members, with the Holstein-Friesian Association of Chile. The productivity of many herds is being increased by the use of proven bulls of this breed.

As the bulk of the cattle in this zone represent dairy types which are given relatively good care and feed, production is above the country's average, and it is estimated that 40 to 45 percent of Chile's milk supply is produced annually from the 30 percent of the country's dairy cows located in this zone. Annual average production per cow is believed to be about 4,000 pounds. Since Holstein-type cows predominate, the average butterfat test of milk ranges from about 3 percent in the flush to about 3.5 percent during the winter. The annual average test is about 3.2 percent.

Milk production in the South Central Zone is carried on under conditions of moderately greater rainfall, with slightly fewer irrigated pastures, with less intensive cultivation, and with a relatively greater number of herds of moderate size (50 to 100 cows). Production is largely concentrated in the Los Angeles area. As in the case of the North Central Zone, a large part of the irrigated land is in pastures which furnish much of the year-round feed supply. Hay and concentrates are also fed, especially to cows producing milk for fluid use in a few of the larger cities of the Zone. A relatively large percentage of the cattle are of the Hollando-Argentino and dual-purpose types, and the average production per cow is lower than in the North Central Zone. This zone, with about 20 percent of the country's dairy cows, is believed to account for an equivalent percentage of Chile's annual milk production. Annual average production per cow is believed to be between 2,500 and 3,000 pounds. Butterfat tests of milk run as high as 3.7 percent and the year-round average test is over 3.5.

The zone appears to be of primary importance in the production of manufactured products made from whole milk. The Los Angeles plant of Chile's principal milk processing company, which is now making only condensed milk, is being expanded by the installation of a large milk drying unit for the manufacture, primarily, of dry whole milk. In addition, there are a number of cheese and butter processing plants in the valley, and cheese and butter processing facilities are located on a number of the fundos. Butter also is made in a few factories some of which are processing casein from skim milk, and additional butter is made at the condensery from cream separated in standardizing milk for processing.

Milk production in the Southern Zone is much less intensive. It is characterized by the use of a variety of dual-purpose cattle, including Clavel Aleman, Overo Negro, Shorthorn and other breeds and mixtures; there are some Hollando-Argentinos, and an increasing number of Holsteins are being brought from Canada and the United States. Rainfall is generally more than adequate especially in the important southern part, and the number of irrigated pastures is small. On many farms and ranches, cattle are dependent entirely on unimproved pastures. Beef production is often as important as dairying, and on many farms the cows are milked only after the calf has finished and only during the spring and summer when pastures are green.4/ "...during the winter /the cattle/ are left to shift for themselves in thickets of quila (an evergreen bamboo that offers forage in the rainy winter when pastures are poor)." 5/ When beef prices are favorable relative

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4/ On a number of farms the calf finishes the milking, and much of the higher butterfat milk is lost to commercial use.

5/ Philip M. Davenport, Dairy Products, March 2, 1951. (Unpublished report. Copy on file at American Embassy, Santiago).

to milk or cream, calves may be allowed to take the milk. If pastures are good and milk prices relatively high, more cows will be milked. Thus, there is a wide variation both in seasonal production and in the amount produced from year to year. At the plant of the principal milk processing company, receipts are about three times as great in summer as in winter in spite of price incentives aimed at a more regular seasonal flow. Although there is a wide range in the size of farms and of herds, a few of which are reportedly in excess of 1,000 cows, a large number of long-established German and other European colonists in this area have farms and herds of moderate size. The average herd from which milk is sold to the condensery-drying plant in Osorno is reported to be about 115 head, and this is believed to be fairly typical. Condensed milk, dry whole milk, and occasional lots of butter are processed in this plant.

This is the principal butter producing zone. Large quantities are produced in a number of butter plants, some of which also produce moderate amounts of casein. Cheese plants are being established. Large quantities of butter and cheese are made on individual farms for consumption or subsequent sale. Most of the seasonal supply of skim milk is fed to calves or hogs. It is estimated that from 30 to 35 percent of the country's annual milk production is found in this area, the percentage varying according to conditions described above. This milk comes from about 45 percent of the number of Chilean cows milked. The average yield per cow is probably little more than 2,000 pounds annually. The cattle probably are capable of greater production, but the lack of improved pastures and supplemental feed, the short period of lactation and the practice of letting calves run with the cows have tended to minimize milk yields. The average butterfat test of milk produced is slightly higher than 3 percent.

Producers' Cooperatives

Of increasing importance in the production and marketing of milk are the operations of about 20 milk producers' cooperatives, which assemble and market milk or process dairy products in 14 of the principal Provinces throughout central Chile. They account for over 25 percent of the country's milk production.

The principal activity of most of these associations is that of marketing or bargaining for the sale of fluid milk in a number of the major urban centers. The cooperatives have some ownership and control in several of the pasteurizing plants. At the present time, they furnish nearly 35 percent of the country's estimated total fluid milk supply and a considerably greater percentage of the fluid milk for the larger cities.

Three of these associations supply in the neighborhood of 50 percent of the total milk receipts at the three plants of the country's principal milk processing company, and two plants of the company are owned in part by the associations supplying milk. Six of these associations have their own butter processing equipment and at least three of them make cheese. Possibly as much as 30 percent of Chile's butter and 15 percent of the cheese is made from milk supplied by these associations.

Some of these cooperatives aid in supplying producers with feed and equipment, and help is given by the association at Santiago in the sale of butter and cheese. A federation of cooperatives has been formed and the establishment of a cooperative bank and a consumers' product market is being considered.

Estimates of Production

In Chile, as in many other Latin American countries, estimates of the number of cows kept for milk, the number milked during a given year, production per cow, and total production all appear subject to a fairly sizable error. The most dependable estimates are generally of total cattle numbers and the total number of cows kept for all uses. It is significant that there has been little or no change in Chile's total cattle population over the past 15 years or more. The present total number of cows, estimated at about 750,000, is substantially the same as in 1936-37. Although the cattle show predominantly Holstein characteristics, and there are at least 20,000 registered Holstein cattle, the majority probably should be regarded as of dual purpose type. The percentage of cows milked has increased irregularly. In 1937 less than 37 percent were so reported, but in recent years it appears that about 70 percent are milked annually. The exact percentage, of course, varies from year to year depending on the availability of feed and dairy labor and on the returns for milk relative to such competing products as beef. In the year ended about May 1, 1950, the number of cows milked showed a decline from the preceding year due in part to a drought in southern pastures and in part to dissatisfaction over the returns from milk. Since estimates of the total number of cows appear relatively reliable and consistent, estimates of production probably should take into account carefully derived estimates of the percent of cows milked during the year as well as the average yield per cow throughout the period of lactation. Some reconciliation can then be made with independent estimates of milk utilization. Estimates along these lines lead one to suspect that the absolute quantity of production may be somewhat less than official estimates of around 700 million liters (1,590 million pounds) annually. From the standpoint of probable milk utilization the estimates of production for the years just prior to 1948-49, while low, appear more readily explainable than the official estimate for the year which shows a very sharp increase (35 percent) from the preceding year. The principal factor causing this inconsistency appears to be the annual estimates of the number of cows milked in the North Central Zone. This area should be relatively stable in this respect, but the number of milk cows in 1948-49 was officially estimated at 45 percent greater than a year earlier, while the number estimated for 1949-50 showed a decline of 21 percent from 1948-49.

The above considerations suggest a preliminary estimate of milk production for 1950-51 of about 650 million liters (1,477 million pounds). This is based on an estimate of 530,000 cows milked and a weighted average annual production of 1,226 liters (slightly less than 2,800 pounds) per cow.

Utilization Patterns

While some estimates of utilization may be subject to even greater error than estimates of production, such estimates are necessary to a consideration of the average per capita consumption of dairy products in terms of food nutrients. The following estimates of milk utilization were prepared by the Chilean Institute of Agricultural Economy in August 1950:

Use	Million liters	Million pounds 1/
Fresh consumption, Santiago and Valparaiso......	100	227
Fresh consumption, rest of country.............	150	341
Condensed, dried, and evaporated milk, etc.	70	159
Cheese....................................	150	341
Butter....................................	230	522
Total.................................	700	1,590

1/ Converted from liters (1 liter = 2.27 pounds).

The quantity of milk estimated for fluid use appears fairly reasonable in terms of consumption estimates developed for Santiago. Although the quantity of milk used by condenseries and milk drying plants may be fairly high in terms of receipts in 1950 when a producers' strike reduced July deliveries, it is believed to be a fair estimate of current (1951) utilization in view of the quantities received by the principal processing company. It is large enough to include an allowance for the production of other companies. That the quantity of milk used in cheese at first appears high may be partly explained by the widespread practice of making large quantities of farm cheese for home consumption. In addition to the estimates shown, an allowance might properly be made for the use of about 10 million liters (23 million pounds) of milk annually in the production of ice cream. The quantity of milk reportedly used in the production of butter, however, appears high. An estimate of the Ministry of Health placed the amount of milk used in butter at around 120 million liters (273 million pounds) in 1948.

On the basis of these considerations, the following utilization pattern is suggested for 1951:

Item	Utilization 1/		Percentage of total
	Million liters	Million pounds	Percent
Fluid milk...........................	280	636	43.1
Dry whole and modified milks, condensed and evaporated milk.......	70	159	10.8
Ice cream............................	10	23	1.5
Cheese...............................	150	341	23.1
Butter...............................	2/ 140	318	21.5
Total.............................	650	1,477	100.0

1/ This is intended to represent the approximate breakdown of apparent first use and is slightly less indicative of final use. A small part of the milk received at condensery-drying plants is diverted to fluid markets. On the other hand, cream obtained in the standardization of milk at some fluid milk pasteurizing plants and at condensery-drying plants is used in making butter. Some of the butterfat in milk that used for making cheese is separated from the whey for making butter.

2/ Excludes about 30 million liters (68 million pounds) in milk equivalent of butterfat obtained from milk standardization in pasteurizing plants and condensery-drying plants and from cheese whey.

A summary of estimated total and per capita daily consumption based on the apparent first use of milk in Chile in 1951 is given below. Butter has not been included, because its consumption is confined mainly to higher income groups and because it contains relatively small quantities of the important proteins, lactose, calcium and other minerals, and vitamins. Exports are restricted by the Government, and imports are insufficient to affect these estimates.[6]

It should also be recognized that distribution is far from equitable, either on a geographic basis, due to marketing and transportation problems, or on a basis of human need, due principally to the very low incomes of large groups of day laborers (jornaleros), worker tenants (inquilinos), and sharecroppers (medieros).

Item	Daily consumption of milk in milk equivalent	
	Total Quarts	Per capita Pints
Fluid milk	811,500	0.270
Dried whole and modified milks, condensed and evaporated milk	202,700	0.068
Total milk	1,014,200	0.338
Cheese	434,300	0.145
Ice cream	29,000	0.010
GRAND TOTAL	1,477,500	0.493

This represents an annual per capita consumption of about 193 pounds compared with a United States average of about 550 pounds. Although additional proteins are obtained from beef, fish, pork, mutton, and poultry products, the typical diet is heavy in high-caloric foods especially cereals, and low in proteins of animal origin.

6/ The milk equivalent of imported dried milk products and condensed and evaporated milk in 1950 amounted to less than 1 million liters (2.3 million pounds). Butter and cheese imports in 1951 are expected to be negligible.

Outlook for the Production of Milk and Dairy Products With Special Reference to Export Possibilities

This section is aimed at an evaluation of present and prospective conditions in the production of milk and dairy products, especially as they relate to Chile's possibilities as an exporter of these products.

With the possible exception of butter, Chile is substantially self-sufficient in the production of dairy products under present economic conditions. The imports of canned milks constitute a special case rather than an exception to this rule, as is explained below. The production and utilization of milk are closely related to internal matters of Government policy and marketing patterns, as well as to conditions affecting production. It appears advisable, therefore, to consider conditions affecting each product, as well as those affecting milk production as a whole.

Outlook for Milk Production

As noted earlier, the lack of growth in the cattle population of Chile for the last 15 years, together with the apparent relatively limited rate of increase in the number of cows milked and in milk production in recent years, suggests that any further increase in milk production will be slow. Beef and milk production already play an integral part in the general agriculture of large sections of the North and South Central Zones. It is estimated that over half of the irrigated land of these zones is already in pasture. The Southern Zone, with relatively greater quantities of arable land, appears to be well stocked with cattle. Milk production and marketing on most farms is still carried on in an inefficient and frequently unsanitary way, and improvements probably will continue to be gradual. Transportation is still a serious problem.

Chile's expansion in industry and business has been steadily attracting a greater percentage of the population to urban areas, and in the last 10 years it has actually resulted in a decline in the population and shortages of labor in some important milk producing Provinces. Expanding urban areas have tended to reduce the area available to farming. This trend implies a greater domestic demand for fluid milk, ice cream, and other dairy products and will tend to restrict the quantity for export.

In setting the price of milk and dairy products the Government hoped to encourage dairying at the expense of beef production and at the same time keep the price of dairy products within reach of all income groups. The prices established for most domestically produced dairy products, however, appear to be too low to encourage practices which would increase production or the installation, especially on farms, of equipment suitable for the delivery of better milk. The Government-sponsored importation of a large quantity of Argentine butter in 1950 to meet an expected deficit in Chilean supplies sharply reduced butter prices and returns to dairymen, especially in southern areas.

Outbreaks of foot-and-mouth disease and the incidence of brucellosis, tuberculosis, and other diseases and pests have also caused some problems in herd improvement and retarded the increase in milk production.

Steps are being taken to increase milk production. Better highways and new farm-to-market roads are opening new areas in several Provinces of the North and South Central Zones, and additional road improvements are being projected for the Southern Zone. Cheese factories are being built or expanded in the Central Valley of the Southern and South Central Zones. New milk drying plants are being installed and existing facilities expanded.

Construction of the Ministry of Health-UNICEF milk drying plants is expected to demonstrate the feasibility of these plants for commercial use. Nonfat dry milk can not only furnish valuable, sanitary food nutrients on a year-round basis to needy mothers and children but can also contribute to the nutritional adequancy of the general diet, and may improve returns to producers from milk used primarily in the manufacture of butter and other cream products.

Comprehensive programs aimed at herd improvement and sanitation, the improvement of feed supplies and feeding practices, the combating of foot-and-mouth disease, brucellosis, and tuberculosis, the training of specialized dairymen, the acquisition and proper use of pasteurizing, drying, and milk processing equipment, the encouragement of dairy cooperatives,and the improvement of other phases of dairying are being actively carried on by the Division of Animal Husbandry, Institute of Agricultural Economy, Bacteriological Institute of Chile, and a number of other Government agencies. The introduction of pasteurizing equipment in a number of cities by the cooperatives and by Central de Leche Chile, a Government organization, has awakened greater interest both in the production and consumption of milk for fluid use. Subsidies and credits are being extended to dairy organizations and individuals.

The Chilean Government and international agencies are extending considerably the area of land under irrigation and improving farming practices. A gradual decline in average yields of wheat, barley, corn, and pulses has focused attention on the need for fertilizers and better schemes of crop and pasture rotation to prevent soil depletion and erosion and increase supplies of food and feed. The introduction and increasing use of farm equipment, especially in the Southern Zone, where rains are frequent, is not only resulting in a greater saving of forage and grain crops for beef and milk production, but is reducing the amount of feed necessary for oxen. The introduction of labor-saving dairy and hay-drying equipment, has been encouraged by the increasing availability of hydroelectric power.

Greater attention is being given to the establishment of controlled-temperature storage facilities which are necessary in the preservation of dairy products and in the curing of cheese.

Possibilities by Zones

While an increase in milk production is possible in all three areas, the greatest long-term opportunities appear in the Southern Zone, which supports nearly half the country's cattle and contains about 40 percent of Chile's arable land. Trade sources estimate that production in this area could be considerably increased if price controls were removed. Frequent rains make grain production risky, and the logical alternative appears to be dairying. Feed production could be sharply increased by a greater use of modern equipment, especially hay driers, and by better farming methods; and the carrying capacity of pastures could be increased through the use of fertilizers and improved forage crops and a system of rotation. The further improvement of existing roads will facilitate the marketing of whole milk from areas now producing butter.

Other factors which appear to make this zone particularly promising in milk production include: the large number of farmers of German and Swiss descent who have a long background of dairying and livestock care; the naturally cool, though rainy, climate; the increasing amount of electric power which should help alleviate any labor shortage and aid in milking and cooling operations and in the production of artificially dried hay; and the greater attention which is being given to the housing of dairy cattle. An additional advantage is that much of the labor available for dairying is of Northern European stock; in the North Central and South Central Zones, dependence is placed principally on semi-skilled inquilinos.

In the South Central Zone, new highways are opening the producing areas of several Provinces. New irrigation projects are being started, especially in Bio-Bio, and new milk processing equipment is being installed. The use of sugar beets, a satisfactory winter forage, is being started. Important potential areas south and east of Los Angeles can readily be developed.

In the North Central Zone, a milk receiving and pasteurizing plant is proposed for the city of Talca and an additional drier is being installed at Graneros. The large Maule Lake irrigation project and other works are expected to add many thousand acres to the large areas of existing pastures in this zone. Roads and processing facilities are being proposed for the Provinces of Maule and Curico.

New species of plants are expected to increase the carrying capacity of pastures in dry farming areas of the country.

Outlook by Commodities

Most of the fluid milk supplied to Santiago comes from a few hundred large general farms or fundos that supply milk to three pasteurizing distributors. Winter production from these farms averages about 145,000 liters (153,200 quarts) daily. This is supplemented by the distribution of about 50,000 liters (52,800 quarts) daily by nearby suburban raw-milk producer-distributors. During the summer months, when there is an exodus to beaches and moutains, nearly all of the daily requirements of slightly over 200,000 liters (211,300 quarts) are supplied by the large producers through the three milk pasteurizing plants. The raw milk, with an annual average butterfat content of about 3.2 percent is now standardized to 2.5 percent, the surplus being used in the year-round production of butter. The milk sells at a ceiling price of 6.80 pesos per liter, representing a United States price of about 13 cents a quart. Raw milk is sold by producer-distributors at 6 pesos per liter or slightly more than 11 cents per quart.7/. A modern pasteurizing plant for the daily distribution of about 70,000 liters (74,000 quarts) of pasteurized and bottled milk is being established by the local milk producers' cooperative in a joint enterprise with consumer-shareholders. It is aimed at assuring the producers a steady market, the consumer-shareholders a steddy supply of milk.

Although some milk is being received from a distance of nearly 150 miles to the south, the total daily supply of barely 200,000 liters (211,300 quarts) is about 50,000 liters (52,800 quarts) short of the present wintertime daily requirements.

Pasteurizing plants have been established or are being built for most of the major Chilean fluid milk markets.

On the basis of sales estimated at 215,000 liters (227,000 quarts) daily, per capita consumption in the Santiago market is slightly less than 0.3 pint per person per day. Based on estimates of utilization shown earlier in this report, the average per capita consumption for the country as a whole is about 0.27 pint per person per day.

With the expanding use of pasteurizing equipment in Santiago and other cities increasing the confidence in fresh milk and with the continuous growth of urban areas, the volume of milk required for fluid consumption probably will continue to increase, thus tending to decrease the probability of exports.

A small amount of ice cream, estimated at about 15,000 liters(or about 4,000 gallons) daily during the summer and at a negligible amount during the winter, is sold principally in the Santiago and Valparaiso areas. Testing about 8 percent butterfat, the ice cream is made by two or three relatively large manufacturers and three or four hotels and restaurants for sale to their clients. The distribution of one plant is direct to hotels, tearooms, bars, and restaurants. Another large manufacturer distributes principally through pushcarts.

A considerable volume of ice cream of uncertain quality is also made in hand freezers by small distributors for sale in pushcarts. A much greater number of street vendors sell sherbets and popsicles containing no milk solids

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7/ At the special commercial rate of 50 pesos per dollar. At the present free market rate of about 90 pesos, this would mean United States prices per quart of 7.1 and 6.3 cents, respectively.

Milk for the large ice cream producers comes from a small number of large farms in the Santiago milkshed. The total quantity of milk used probably does not exceed 10 million liters (23 million pounds) annually, but it is gradually increasing.

Dry whole milk is now being produced by the principal milk processing company in the large plant at Osorno. Small amounts are also made from time to time in the Graneros plant, and drying facilities are being installed in the Los Angeles plant of this company. Three additional small plants, one at La Union (Southern Zone), one at Los Andes (North Central), and one at the principal Santiago milk pasteurizing plant, also produce occasional small quantities on roller driers for use in making candies, confections, and pastries. Production, which has been increasing gradually for several years, was estimated at slightly less than 2,500,000 pounds in 1950. The spray products, packed principally in 1-pound cans, is sold largely in the major cities to those uncertain of the sanitary quality of the fluid milk supply or unable to obtain sufficient fluid milk in winter. A small amount is sold to the mines in northern Chile. This milk is favored over condensed milk by the Health Ministry for the feeding of children. The quantity produced domestically is frequently insufficient for the growing national demand. Unlike most domestic dairy products, there are no price controls on dry whole milk at present.

Although, in general, no imports of canned milks are authorized under the present foreign exchange budget, about 60,000 pounds of dry whole milk and from 2,000 to 4,000 cases of evaporated milk have been imported annually from the United States under a special provision of the budget which, in effect, permits concerns engaged in mining copper, nitrates, and iron ore to use their own exchange in the importation of canned milk and other supplies. Since these companies, especially those mining copper, must convert dollars into pesos at relatively unfavorable rates for local purchases, it has paid them to import directly. Under a special agreement with the workers, with Government approval, the imported milk is sold to mine workers in their commissaries at 1931 prices. Since the number of families supplied is estimated at less than 5,000, this market is very limited in size. A new agreement between the Government and the copper companies is now being considered which, through an adjustment in exchange rates, may tend to induce these companies to purchase local dairy products.

Although production of dry whole milk is favored by the present uncertain seasonal supply and quality of fluid milk, the support of the Health Ministry, and the absence of price control, it seems unlikely that it will ever be exported in volume unless encouraged by special Government measures. The necessity of importing processing and canning equipment as well as the necessary cans probably will make its production expensive in terms of Chilean money and exchange and in terms of world market prices.

A variety of modified dried milk products is produced in the large drying plant at Graneros (North Central Zone). Annual production is somewhat smaller than that of dry whole milk. The milk is supplied from the large herds of 60 to 70 producers whose advanced breeding, feeding, and milk-handling practices have resulted in a relatively steady year-round supply of good raw milk. Premiums are paid for cooled milk, and deductions are made for high acidity. Prices are paid on the basis of the fat in the milk and are not much different at this plant than at the large pasteurizing plant in Santiago.

The value of these foods, which are used in feeding infants and invalids, is recognized by the medical profession, and their sale has been increasing, especially in the larger cities. Pricing regulations permit a greater percentage marketing margin than for condensed milk. The rate of production increase, however, is being retarded by the increasing demand for fluid milk in the area where modified milks are being made, and by the limited demand for this type of product.

The relatively high prices which are paid for the raw material as well as for the cans and equipment, as in the case of dry whole milk, make it appear unlikely that these products will offer serious competition in world markets.

The Chilean market for evaporated milk is very small, and domestic production has rarely exceeded 17,000 cases annually, most of it destined for northern mining camps. Production in 1950 amounted to about 16,000 cases. As noted in the discussion of dry whole milk, the relatively small imports of evaporated milk, originating almost entirely in the United States, have also been used almost exclusively in these camps.

Condensed milk is currently being produced at Los Angeles (South Central Zone) and Osorno (Southern Zone) in plants of the principal milk processing company. Some was also produced by a small plant in 1950, when Chilean production was equivalent to slightly over 520,000 cases of 48 14-ounce cans. Rather rigid price controls were partly responsible for the fact that production showed little increase during the past few years. The average price received by producers at the Los Angeles condensery is less than prices paid in the North Central Zone, owing in part to the lower quality of the milk and to the relatively great seasonal variation in receipts. Relatively large shipments of the domestic product are made to northern mining areas and to milk deficit areas of the extreme south. Mining companies, which until 1950 had imported United States condensed milk under the special exchange arrangement referred to in the section on dry whole milk, have recently imported this product from Netherlands suppliers.

It seems unlikely that domestic production will be more than sufficient for local needs under present conditions, and there is some possibility of an increase in imports. Rigid price controls reportedly are diverting some production to dried whole and modified milks. The possibility of continued restrictions on exports and the necessity of importing sugar and cans, as well as replacements of equipment, make the production of condensed milk for export unlikely.

In general, it may be said that the possibilities of Chilean exports of dried and canned milks are limited by the likelihood of export restrictions, by exchange and supply requirements, and by the necessity of importing some of the raw materials, as well as processing equipment and cans.

The national production of nonfat dry milk is increasing sharply. Occasional lots are being or will be made in each of the three principal processing plants and in the three plants which make dry whole milk by roller process. Roller or spray drying equipment is being planned for some of the new milk pasteurizing plants. Production is soon to be initiated in the new Health Ministry-UNICEF plant at San Fernando, and an additional plant is being considered for Temuco. The production of nonfat dry milk in 1950 has been estimated at 500,000 kilograms (about 1,100,000 pounds).

The production of nonfat dry milk is favored by its recognized food value and by its price, which is favorable relative to casein. An increasing quantity of skim milk should be available seasonally from the Provinces in the southern margin of the fluid milkshed (Curico, Talca, and Maule) and from a number of the larger creameries receiving whole milk.

Consumer education is being encouraged by the use of this product in UNICEF school lunch programs and other programs of the Ministry of Health. Some increase is expected in such industrial uses as ice cream, bakery products, and confections.

As in the case of the other dried milks, however, the production of nonfat dry milk requires the importation of drying equipment. The recent policy of butter importation, through its effect on national butter prices, reportedly has caused a shift from the production of butter to the production of such whole milk products as condensed and dried milks and cheese. The production of nonfat dry milk probably will not exceed domestic requirements for some time.

Butter is produced under a variety of conditions in Chile. The bulk of it is produced in the Southern Zone, but some is produced in every Province of Central Chile and in the Province of Coquimbo to the north. Large quantities come from butter and butter-cheese plants located mainly in the Central Valley of the South Central and Southern Zones. Additional large quantities come from fundos and smaller farms in less accessible valleys of Central Chile. City milk pasteurizing plants produce some butter from the cream separated in standardizing fluid milk. Butter is also made on a year-round basis at the large Los Angeles processing plant, and occasional lots are made at the Graneros and Osorno plants of the principal milk processing company. Some butter also is made from whey obtained at cheese plants, many of which are located on large fundos.

Although estimates of butter production vary considerably, the concensus of recent official and private estimates places the quantity at between 6,000 and 7,500 metric tons (13.2 to 16.5 million pounds). It seems unlikely, in view of recent diversions to other whole milk products, that production in

1951 will exceed the 7,000 metric tons (15.4 million pounds) estimated by the Institute of Agricultural Economy for 1949. The Dairy Industry trade list for Chile, issued in February 1948, reports about 25 creameries and a few creamery-cheese plants. 8/ Other creameries probably were then in existence or have since been established. Assuming an average production of 100 tons per creamery per year, which seems liberal, 30 creameries would be required for the production of 3,000 metric tons. A quantity nearly this large is believed to be produced on ranches, and fundos and in small creameries. It seems likely that the production of butter made from cream obtained in standardizing milk in pasteurizing plants, in condensery-drying plants, and from cheese whey may total slightly more than 1,000 metric tons. This would leave a production total of about 7,000 metric tons (15.4 million pounds) for 1951.

From the standpoint of consumption, an estimate of 7,000 metric tons produced appears to be reasonable. Probably not over 25 percent of the entire population, or about 1.5 million people, consume butter in any quantity. This would include most of those in upper and upper-middle income groups in urban areas and a large number of fundo and farm operators making butter, especially in the Southern Zone, where those of European descent have a taste for this product. Assuming that no butter is imported in 1951, this would mean a per capita consumption of about 4.7 kilos (about 10 pounds) per person for the estimated butter consuming segment of the population. This is about the same as current per capita consumption in the United States. Further study probably should be given to these estimates.

The manufacture of butter in Chile has reportedly become unprofitable because of the relatively low ceiling price on this product and because of frequent importation or threats of importation of butter either by a Government agency or privately, under special barter provisions of the exchange budget. It seems unlikely that Chilean butter will be able to compete effectively in world markets, partly because of the severity of price competition. The diversion of whole milk to the production of cheese and other whole milk products probably will continue.

A variety of cheeses of good quality are produced in Chile. Estimates of the quantity of cheese made annually vary widely, and they are complicated by the fact that most of the cheese is made on farms where a lot of it is also consumed. The Dairy Industry list, published in 1948, reports about a dozen cheese factories and about a half dozen butter-cheese factories, some of which are operated by producer cooperatives. However, there has been a significant expansion in the number of industrial cheese plants in the past few years, most of which are to make the better known European varieties.

In view of the rather general practice of making farm cheese, the recent increase in commercial cheese plants, and the almost universal popularity of this food, an estimated annual production of 12,000 to 15,000 metric tons (26 to 33 million pounds) appears reasonable. Since imports are

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8/ This list is available from the United States Department of Commerce, Office of International Trade, Washington 25, D. C., and from regional offices of that Department.

negligible, this would mean an annual average per capita consumption of 2 to 2.5 kilos (4.4 to 5.5 pounds), compared with a United States average of about 7.5 pounds.

A popular national variety of cheese known as Chanco is believed to represent the bulk of the total national production at the present time. This is a soft, white, uncooked cheese made from whole milk, and pressed into large, flat blocks. It is generally aged for 20 to 30 days before being sold. Small amounts of this cheese are made on small farms and in commercial plants, but it is estimated that 70 percent of all commercial cheese, most of it Chanco, is made on large fundos or ranches whose owners market the cheese through their own commission agents or through large farm produce auction houses in Santiago and other cities. These auctions are largely instrumental in determining the price of cheese.

A number of factories are producing a hard, grating type of cheese, sold as Reggianito. It is believed to be second in popularity. Holland-type cheeses are made on farms and in commercial factories and are sold principally in Edam (Bola) styles. A few plants have started making Swiss-type cheeses and some Cheddar is also made. A new plant is being established at Loncoche in the Southern Zone for the manufacture of Chanco and process cheese. Other types of cheese are produced in only small quantities.

The production of cheese in Chile has a number of apparent natural advantages not common to the other dairy products. These include a history of successful cheese making on fundos and in factories, a general taste for and interest in cheese, and a climate apparently suitable for its manufacture. An increasing number of European varieties are being successfully produced.

The difficulty of establishing equitable price ceiling for the various qualities and types of cheese has helped to bring about its freedom from price control and has contributed to the relatively higher returns for cheese than for butter. With the progress of road construction in the more remote milk producing areas, additional milk is apt to be diverted into cheese production.

Chile's natural possibilities as an exporter of dairy products seem to lie mostly in the production of high quality cheese of specialized types.

Factors in Chile's Business Outlook

Measured in terms of the relative number of persons employed, Chile is one of the most advanced countries in South America in industry and commerce. Although agriculture employs the largest number (35 percent) of Chile's working population, about 25 percent are employed in industry, and 12 to 15 percent in commerce. Mining, despite its great importance in terms of the value of exports and of foreign exchange, is estimated to employ only about 5 percent of Chile's workers. The general level of purchasing power, however, is still quite low. In July 1949, the average daily wage paid in the more important industries was 108.5 pesos, or a little more than US$1.00 at the free market rate of exchange at that time. 9/ The leading manufactured products include woolen and textile goods, pharmaceuticals, toilet articles, footwear, pulp and paper, cement, glassware, and wood manufactures. The production of steel ingots has been started at a new mill made possible by loans from the Export-Import Bank. The expansion in hydroelectric power plants has made it virtually unnecessary to ration electric power and will serve to provide for future expansion of the manufacturing and transportation industries. Rent ceilings and high construction costs have recently slowed down the building of dwellings and resulted in some accumulation of building materials such as cement. The construction of highways and irrigation projects has continued, however.

Although considerable increase took place in Chile's foreign exchange assets during 1950, stringent import and exchange controls are being maintained to provide for imports of equipment and supplies for Chilean industrial and transportation enterprises, the development of iron and petroleum resources, and payment on Government and commercial foreign debts.

The probability of a long-term increase in Chile's ability to import, however, is favored by prospects for a significant increase in the value of exports of minerals, which are the principal source of foreign exchange. Exports of iron and steel and petroleum products should increase as the new iron and steel plant comes into full production and as the large potential sources of petroleum are developed. Exports of nitrates are also expected to increase, and increased exports of copper are favored by an important expansion of the processing plant at Chuquicamata, the site of the world's largest known deposit of copper ore. Chile is almost self-sufficient in the production of coal. The possibility of developing electric power on an even larger scale is suggested by the progress recently made in harnessing Chile's Andean rivers. As these and other resources are developed and Chile's per capita earning power increases, Chile will become increasingly important in world trade, both as an importer and exporter.

9/ Chile - Summary of Basic Economic Information, International Reference Service, Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce, August 1950.

In the meantime, the prospects for any increase in imports of dairy products are limited by the generally low level of purchasing power of the bulk of the population, the low level of prices of domestic products in terms of the free market, and the necessity of limiting imports of those foodstuffs in which Chile is relatively self-sufficient in order to conserve foreign exchange. Argentine butter was imported in 1950 to control prices and supplement supplies, but further imports are not contemplated for the near future. The 1950 transactions were authorized under a barter arrangement in which Chilean cement was used in payment. There is little chance that imports of dried whole milk or condensed and evaporated milk from the United States will increase significantly in the near future. Virtually all of the limited imports of these commodities have gone to the northern mining companies under a special import arrangement, and because the milk is sold in the commissaries at 1931 prices the companies are unlikely to import more than the quantities essential to the welfare of their employees. There is also the possibility that evaporated and dried whole milk, as in the case of condensed milk, may be purchased at lower prices from European suppliers.